PREVALENCE AND ASSOCIATED RISKS OF INJURY IN AMATEUR STREET RUNNERS FROM BELO HORIZONTE, MG

LOCOMOTOR APPARATUS IN EXERCISE AND SPORTS

ORIGINAL ARTICLE

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ABSTRACT

Introduction: The practice of street racing has increased in recent years, both for its ease and the low cost involved. This practice, however, involves risks of musculoskeletal injuries. Objective: To assess the prevalence of musculoskeletal injuries and analyze associated factors among street racers amateur of Belo Horizonte / MG. Methods: We conducted a cross-sectional observational study. Sample selection was by convenience. The participants were 100 amateur athletes with at least three months of practice running with minimum frequency of twice a week. We collected data on the prevalence of injuries and associated factors using a structured questionnaire. Results: The prevalence of injuries among athletes was 40%. Among the factors associated with injury include the distance and the variation in average daily volume of training. Conclusion: The prevalence of injuries in amateur runners is considerable, although it was reported by less than half of the participants. The characteristics of training may trigger injury and should be carefully analyzed so that the race is held securely.

Keywords: race, prevalence, injury.

INTRODUCTION

With the purpose to prevent the onset of many several chronic diseases, the American College of Sports Medicine (ACSM) and the American Heart Association (AHA) recommend the practice of physical activities of long duration, moderate intensity and with involvement of great muscular groups, whose characteristics perfectly fit in running[1].

Running is a modality with a great number of practitioners, both due to its easiness of practice and its health benefits and low cost involved. It has become popular for these and other reasons; however, the individuals who practice it either in the competition or recreational field, are exposed to occasional associated risks, especially if the movement or training format are innapropriate[2,3].

The commonest osteomuscular injuries in running occur in the lower limbs. A recent meta-analysis revealed that the incidence of injuries in running practitioners ranges from 19.4% to 79.3%, being the knee joint the most mentioned[4].

The injury mechanism related to running respects a pattern common to all injuries in the different sports and derives from the overlap of many factors. These factors may be divided in extrinsic or intrinsic. The extrinsic factors are those which direct or indirectly are connected to the running preparation or practice and involve errors in the training planning and performance, kinds of training surface, kind of itinerary, kind of shoewear, eating habits and practice joined with other sports modalities. The intrinsic factors are those connected to the body and include biomechanical and anatomic abnormalities, flexibility, injury history, anthropometric characteristics, bone density, body composition and cardiovascular conditioning[5-8].

Thus, running either amateur or professional, involves musculoskeletal injuries risk. Therefore, the aim of this study was to verify the prevalence of osteomyoarticular injuries and analyze the associated factors in amateur street runners of Belo Horizonte, MG.

METHODOLOGY

Study outlining and ethical aspects

A transversal observational study was conducted. The study was approved by the Ethics in Research Committee of the Newton Paiva University Center (CAEE 0013.0.273.000-10). All individuals received information about the aims of the research and signed a Free and Clarified Consent Form before the data collection.

Sample

The sample selection was by convenience. Athletes with different practice sites were evaluated and the collection was performed in 11 places frequently used for running practice in Belo Horizonte ("Lagoa Seca' region, Avenida Bandeirantes, Praça JK, Avenida José do Patrocínio Pontes, Praça da Assembleia, Avenida José Cândido da Silveira, Lagoa da Pampulha, Avenida Silva Lobo, Parque Municipal, Avenida dos Andradas and Praça da Liberdade). The research was performed with amateur athletes who practiced running for at least three months, with minimum frequency of two times per week and whose age ranged between 18 and 60 years. Participants who performed another sport practice concomitantly or presented previous trauma history in lower limbs were excluded. 100 volunteers with predominance of the male sex (73%) participated in the research. The sample was divided in injured group (IG) and non-injured group (NIG)

Procedures

Data were collected by previously trained researchers for standardization of the interview. The sample was characterized through the application of a questionnaire designed by the researchers with information concerning sex, age, weight, height and body mass index (BMI). Prevalence was analyzed considering injury any pain or aggravation which had limited or put away for one or more days the participation of the athletes in training and/or competitions in the last six months[9]. Concerning the associated factors, data about the training variables were collected. The time of the running practice, weekly frequency, daily mean distance, training duration, time of shoewear use, habitual time of the training and training recent variation were investigated. The variables mentioned above were selected for being frequently associated with the risk factors to injury in running[4,5,8].

Statistical analysis

Descriptive statistics was used for sample characterization. The Student's t and Mann-Whitney U tests for independent groups were applied for evaluation of differences between groups. A significance level of $\alpha = 0.05$ was considered in the inferential analyses. All data were analyzed through the SPSS program, version 15.0.

RESULTS

The sample characterization is demonstrated in table 1. In a general analysis, the volunteers were adults and healthy. No significant differences have been identified between the NIG and IG groups.

Table 2 expresses the quantitative variables in the IG and NIG groups. In the analysis between groups, the mean daily distance completed was the only variable with significant statistical difference ($p = 0.004$). There were no significant differences between genders within the same group and in the different groups ($p > 0.05$)

Table 1. Descriptive characteristics of the sample.

Variables	Total (n = 100)	IG (n = 40)	NIG (n = 60)	p value
Age (years)	34.7 ± 11.4	35.4 ± 11.2	34.0. ± 11.5	0.55
Body mass (kg)	73.1 ± 12.3	73.2 ± 10.9	72.9 ± 13.3	0.92
Height (m)	1.73 ± 0.9	1.75 ± 0.8	1.72 ± 0.9	0.22
BMI	24.2 ± 2.8	23.9 ± 2.3	24.4 ± 3.1	0.46

Values expressed in mean ± standard deviation; IG = injured group; NIG = non-injured group; kg = kilo; m = meter; BMI = body mass index.

Table 3 presents the habitual time and the recent training variations. In the IG, the majority of the athletes (45%) trains in the morning shift, while in the NIG they train in the evening shift (61.6%). More than half of the athletes from IG (52.5%) performed a recent variation in training.

DISCUSSION

It is important to identify the prevalence and the factors associated with injuries in running so that efficient prevention measures can be adopted. Van Gent et al.[4] stated that running can be considered a sport with high risk of injury onset. The present research included 100 volunteers and the prevalence of injuries was of 40%. The results obtained agree with the study by Macera[10] who, in a literature review, reported injury prevalence within 24 and 65% among runners.

However, in the literature, great variability is observed in the data of injury onset. Taunton et al.[11] verified prevalence of 29.5% in a sample with 844 runners; Hootman et al.[12], 25% with 6,313 runners

Table 2. Description of the quantitative variables of the injured and non-injured groups, subdivided by gender.

Variables	IG			NIG			
	Male	Female	Total	Male	Female	Total	p value
Athletes (n)	30	10	40	43	17	60	-
Time of practice (meses)	73.8 ± 108.1	25.6 ± 20.9	61.8 ± 96.1	76.3 ± 101.9	31.5 ± 54.8	63.9 ± 9.9	0.91
Weekly frequency	3.6 ± 1.0	3.7 ± 1.0	3.7 ± 1.0	3.7 ± 1.1	3.9 ± 1.3	3.7 ± 1.2	0.77
Daily mean distance (km)	7.9 ± 3.1	5.9 ± 1.2	7 ± 3.2	6.2 ± 3.2	5.4 ± 2.1	5.5 ± 3.2	0.004*
Training duration (min)	54.9 ± 19.8	53 ± 16.4	54.3 ± 18.6	51 ± 23.6	48.2 ± 18.9	50.3 ± 22.3	0.29
Time of footwear (months)	12 ± 9.7	8.3 ± 6.9	11.1 ± 9.1	9.4 ± 5.3	36 ± 9.4	9.1 ± 6.6	0.29

Subtitles: Values expressed in mean ± standard deviation; IG = injured group; NIG = non-injured group; km = kilometers; min = minutes; * = Significant difference between IG and NIG.

Table 3. Habitual time and recent training variations.

Variables		IG n (%)	NIG n (%)	TOTAL
Habitual training time	Morning	18 (45)	12 (20)	30 (100)
	Afternoon	3 (7.5)	7 (11.6)	10 (100)
	Evening	16 (40)	37 (61.6)	53 (100)
	Different shifts	3 (7.5)	4 (6.6)	7 (100)
Recent training variation	Velocity	3 (7.5)	6 (10)	9 (100)
	Distance	2 (5)	7 (11.6)	9 (100)
	Frequency	5 (12.5)	2 (3.3)	7 (100)
	More than one alteration	11 (27.5)	4 (6.6)	15 (100)
	Total	21 (52.5)	19 (31.6)	40 (100)

IG = injured group; NIG = non-injured group; n = number of athletes; % = percentage.

included in the study; Rosendal et al.[13], 28% in a study involving 330 military subjects; Hino et al.[14], 28,5% with a sample composed of 295 amateur runners; and Middelkoop et al.[15], 54.8% in a study conducted with 725 participants of the Rotterdam marathon. Partly, the variability in the results derives from the heterogeneity of the sample as well as methodological divergence in the studies.

The investigations on injury in sports find great difficulty due to the methodological aspects as criteria for cataloging of the injury concept. In our study, we considered injury any pain or aggravation which had limited or put away for one or more days the participation of the athlete in training and/or competitions in the last six months proposed by Lun et al.[9]. Nevertheless, other definitions are also used. Rudzki[16] and Fauno et al.[17] considered injury as a nosological diagnosis performed by a doctor; Pollock et al.[18], na event which hampered the athletes from running for at least one week; Pope et al.[19], the incapacity to complete the daily tasks without sign and symptoms within three days; and Pastre et al.[20], pain or musculoskeletal affection resulting from sports training and competitions and which was sufficient to cause alterations in the normal training. Thus, standardization becomes necessary so that the results can be confronted.

The literature has not reached a consensus regarding the differences in the prevalence of injuries among men and women. It is stated that biomechanical, hormone and neuromuscular factors play a crucial role in the onset of injuries[21,22]. In the present study, there were no differences between genders. Similar prevalence in the male (41%) and female sexes (37%) was observed. The sample size, the lack of biomechanical quantitative data, the nosological diagnosis and the laboratory information made a data analysis impossible.

Concerning the quantitative variables, the mean distance completed per day was the only variable with significant statistical difference between the IG and NIG (p = 0.004). The frequency of adverse results increases when the athletes are engaged in running programs in which the weekly itinerary is longer than 32km[23]. According to Yeung and Yeung[5], there is scientific evidence that the reduction in the distance completed may reduce the onset of injuries. Hootman et al.[12] conclude that increase in risk of musculoskeletal injury increases among runners according to increase in weekly training volume. The runners who trained more than 3.75 hours/weeks presented 2.38 more probability to suffer injury when compared to individuals who trained less than 1.25 hours/week. Fredericson and Misra[24] corroborated that higher weekly kilometer distance represents higher risk of injury.

An important point to be reflected, besides the training volume (distance), is the training intensity (velocity). It can be deducted that the IG and NIG presented different training velocities, since they did not present difference in the training duration (time), but, at the same time, presented difference in the mean distance completed (km). Thus, it can mean higher mean velocity in the IG compared to the NIG, although this variable had not directly been measured in this investigation. Perhaps, due to the difficulty in in loco measurement, there are few studies in the literature which explain the relationship between training velocity and onset of injuries.

Concerning the categoric variables, the training time was not distinct between the IG and NIG, and this variable was not considered a cause or protection factor to the activity, according to data found in the study. Regarding the training alterations, 52.5% of the individuals in the IG performed a recent variation in training against 31.6% in the NIG. Yeung and Yeung[5] observed that there is Strong association between alteration in training and onset of injuries by overload. Sudden changes in training do not allow physiological adaptation of the organism, leading to tissue injury[25].

Considerable prevalence of injuries in amateur street runners was observed, despite the short observation time of short months. The negative consequences of the injuries affect the psychological well-being of the athlete and can compromise his/her mental health through symptoms such as depression, fear, frustration, impatience and self-image unfavorable to the practice of the sports modality[26].

We chose to perform data collection in places frequently used for running practice in the city of Belo Horizonte without previous environmental analysis of the terrain; however, we stress that different places for running practice impose different overloads during the activity, which may have reflected on the results.

Among the limitations to the study we can mention the management of the injury, which is susceptible to the memory bias, and the study outlining which does not allow cause inference.

CONCLUSION

It can be concluded that among the amateur street runners of the city of Belo Horizonte, MG, 40% of the interviewed volunteers reported to have suffered some kind of injury over the last six months. Among the associated factors to the injury we highlight daily mean distance and variation in the training volume. Thus, the training characteristics may trigger injuries and should be carefully analyzed so that the activity is safely performed.

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